

L2 ANSWER 6 OF 13 CAPLUS COPYRIGHT 2003 ACS on STM

ACCESSION NUMBER: 1979:90170 CAPLUS

DOCUMENT NUMBER: 90:90170

TITLE: The crystal structure of griphite, a complex phosphate, not a garnetoid

AUTHOR(S): Rinaldi, Romano

CORPORATE SOURCE: Ist. Mineral. Petrol., Univ. Modena, Modena, Italy

SOURCE: Bulletin de Mineralogie (1978), 101(5-6), 543-7

CODEN: BULMD9; ISSN: 0180-9210

DOCUMENT TYPE: Journal

LANGUAGE: English

AB X-ray diffraction data of a nonmetamict griphite [12274-59-8] sample from Alberes (East Pyrenees) indicate a garnet-like 3-dimensional network form by chains of alternating AlO₆ octahedra and PO₄ tetrahedra. The overall topol. differs from that of garnet, by the presence of a second system of chains formed by alternating FeO₆ octahedra, PO₄ tetrahedra, and CaO₆F₂ cubes, all of which share only 0 vertices. Within this main framework, 1 site has an irregular coordination assocd. with a distorted trigonal bipyramid sharing 1 edge of the Fe octahedron; Mn, Na, and Li generally occupy this site.

IT 12274-59-8

RL: PRP (Properties)

(structure of, nongarnetoid classification in relation to, of Alberes, East Pyrenees)

L3 ANSWER 1 OF 2 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 2003:97868 CAPLUS

DOCUMENT NUMBER: 138:140078

TITLE: Alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials

INVENTOR(S): Barker, Jeremy; Saidi, M. Yazid; Swoyer, Jeffrey L.

PATENT ASSIGNEE(S): UK

SOURCE: U.S. Pat. Appl. Publ., 22 pp., Cont.-in-part of U.S. 6,387,568.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 3

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2003027049	A1	20030206	US 2001-14822	20011026
US 6387568	B1	20020514	US 2000-559861	20000427
TW 503596	B	20020921	TW 2001-90109979	20010426
US 2002168573	A1	20021114	US 2002-133091	20020426
WO 2003038930	A2	20030508	WO 2002-US33510	20021018

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

PRIORITY APPLN. INFO.: US 2000-559861 A2 20000427
US 2001-14822 A 20011026

AB An electroactive material comprises: $AaMb(XY_4)cZd$, wherein (a) A is selected from the group consisting of Li, Na, and/or K, and $a = 0-8$; (b) M is .gtoreq.1 metal, comprising .gtoreq.1 metal which is capable of undergoing oxidn. to a higher valence state, and $b = 1-3$; (c) XY_4 is selected from the group consisting of $X'O_4-xY'x$, $X'O_4-yY'2y$, $X''S_4$, and mixts. thereof, where X' is P, As, Sb, Si, and/or Ge; X'' is P, As, Sb, Si, and/or Ge; Y' is halogen, $x = 0-3$; and $y = 0-4$; and $c = 0-3$; (d) Z is OH and/or halogen, $d = 0-6$; and wherein M, X, Y, Z, a, b, c, d, x, and y are selected so as to maintain the electroneutrality of the compd. Preferred embodiments include those having where $c=1$, those where $c=2$, and those where $c=3$. Preferred embodiments include those where $a \leq 1$ and $c=1$, those where $a=2$ and $c=1$, and those where $a \geq 3$ and $c=3$. This invention also provides electrodes comprising an electrode active material of this invention, and batteries that comprise a first electrode having an electrode active material of this invention; a second electrode

- having a compatible active material; and an electrolyte.
- IT Battery cathodes
Hydrothermal reactions
(alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials)
- IT Chalcogenides
Olivine-group minerals
Oxides (inorganic). uses
RL: DEV (Device component use); USES (Uses)
(alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials)
- IT Carbonaceous materials (technological products)
RL: MOA (Modifier or additive use); USES (Uses)
(alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials)
- IT Reduction
(carbothermal; alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials)
- IT Phosphates, uses
RL: DEV (Device component use); USES (Uses)
(halide; alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials)
- IT Secondary batteries
(lithium; alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials)
- IT Halides
RL: DEV (Device component use); USES (Uses)
(phosphates; alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials)
- IT 7440-44-0, Carbon, uses 7782-42-5, Graphite, uses 77641-62-4, Nasicon
RL: DEV (Device component use); USES (Uses)
(alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials)
- IT 52934-02-8P, Cobalt lithium fluoride phosphate 52934-08-4P, Lithium nickel fluoride phosphate 257892-19-6P, Sodium vanadium fluoride phosphate (Na₃V₂F₃(PO₄)₂) 477779-87-6P, Sodium vanadium fluoride phosphate NaVFP04 477779-89-8P, Lithium sodium vanadium fluoride phosphate (Li_{0.95}Na_{0.05}VF(P04)) 484039-84-1P, Cobalt lithium fluoride phosphate (CoLi₂F(P04)) 484039-86-3P, Iron lithium fluoride phosphate (FeLi₂F(P04)) 484039-88-5P 484039-91-0P, Lithium nickel fluoride phosphate (Li₂NiF(P04)) 484039-93-2P, Iron lithium fluoride phosphate 484039-95-4P, Lithium manganese fluoride phosphate (Li₂MnF(P04)) 484039-97-6P, Copper lithium fluoride phosphate (CuLi₂F(P04)) 484040-01-9P, Iron lithium magnesium fluoride phosphate (Fe_{0.9}Li_{1.25}Mg_{0.1}F_{0.25}(P04)) 484040-04-2P, Sodium vanadium fluoride phosphate (Na_{1.2}VF_{1.2}(P04)) 484040-06-4P, Chromium sodium fluoride phosphate 484040-08-6P, Manganese sodium fluoride phosphate (MnNaF(P04)) 484040-10-0P, Cobalt sodium fluoride phosphate (CoNaF(P04)) 484040-12-2P, Lithium sodium vanadium fluoride phosphate (Li_{0.1}Na_{0.9}VF(P04)) 484040-13-3P, Sodium vanadium hydroxide phosphate

NaVOHPO₄ 484040-14-4P, Iron lithium fluoride phosphate ($\text{Fe}_2\text{Li}_4\text{F}(\text{PO}_4)_3$)
484040-15-5P, Lithium vanadium fluoride phosphate ($\text{Li}_4\text{V}_2\text{F}(\text{PO}_4)_3$)
484040-20-2P, Lithium manganese fluoride phosphate
($\text{Li}_5\text{Mn}_2\text{F}_2(\text{PO}_4)_3$) 484040-22-4P, Lithium vanadium fluoride phosphate
($\text{Li}_6\text{V}_2\text{F}(\text{PO}_4)_3$) 484040-25-7P, Chromium lithium sodium fluoride phosphate
silicate ($\text{CrLiNa}_{0.2}\text{F}(\text{PO}_4)_{0.8}(\text{SiO}_4)_{0.2}$) 484040-27-9P 484040-28-0P
493025-03-9P, Lithium manganese fluoride phosphate 493025-04-0P, Copper
lithium fluoride phosphate
RL: DEV (Device component use); SPN (Synthetic preparation); PREP
(Preparation); USES (Uses)
(alkali/transition metal halo- and hydroxy-phosphates and related
electrode active materials)

L3 ANSWER 2 OF 2 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 2003:42884 CAPLUS

DOCUMENT NUMBER: 138:92874

TITLE: Alkali/transition metal halo- and hydroxy-phosphates
and related electrode active materials

INVENTOR(S): Barker, Jeremy; Saidi, M. Yazid; Swoyer, Jeffery L.

PATENT ASSIGNEE(S): UK

SOURCE: U.S. Pat. Appl. Publ., 22 pp., Cont.-in-part of U. S.
6,387,568.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 3

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2003013019	A1	20030116	US 2001-45685	20011107
US 6387568	B1	20020514	US 2000-559861	20000427
TW 503596	B	20020921	TW 2001-90109979	20010426
US 2002168573	A1	20021114	US 2002-133091	20020426

PRIORITY APPLN. INFO.: US 2000-559861 A2 20000427

AB Electrode active materials comprise lithium or other alkali metals, a transition metal, a phosphate or similar moiety, and a halogen or hydroxyl moiety. Such electrode actives include those of the formula: $AaMb(XY_4)cZd$ wherein (a) A is selected from the group consisting of Li, Na, K, and mixts. thereof, and $0 < a \leq 6$; (b) M comprises one or more metals, comprising at least one metal which is capable of undergoing oxidn. to a higher valence state, and $1 \leq b \leq 3$; (c) XY_4 is selected from the group consisting of $X'O_4-xY'Xx$, $X'O_4-yY'2y$, $X''S_4$, and mixts. thereof, where X' is P, As, Sb, Si, Ge, S, and mixts. thereof; X'' is P, As, Sb, Si, Ge and mixts. thereof; Y' is halogen; $0 \leq x < 3$; and $0 < y < 4$; and $0 < c \leq 3$; (d) Z is OH, halogen, or mixts. thereof, and $0 < d \leq 6$; and wherein M, X, Y, Z, a, b, c, d, x and y are selected so as to maintain electroneutrality of the compd. In a preferred embodiment, M comprises two or more transition metals from Groups 4 to 11 of the Periodic Table. In another preferred embodiment, M comprises $M'1-mM''m$, where M' is at least one transition metal from Groups 4 to 11 of the Periodic Table; M'' is at least one element from Groups 2, 3, 12, 13, or 14 of the Periodic Table, and $0 < m < 1$. Preferred embodiments include those having where $c=1$, those where $c=2$, and those where $c=3$. Preferred embodiments include those where $a \leq 1$ and $c=1$, those where $a=2$ and $c=1$, and those where $a \geq 3$ and $c=3$. This invention also provides electrodes comprising an electrode active material of this invention, and batteries that comprise a first electrode having an electrode active material of this invention; a second electrode having a compatible active material; and an electrolyte.

IT Battery cathodes
NASICONs

- (alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials)
- IT Carbonaceous materials (technological products)
Oxides (inorganic), uses
RL: DEV (Device component use); USES (Uses)
(alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials)
- IT Secondary batteries
(lithium; alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials)
- IT Chalcogenides
RL: DEV (Device component use); USES (Uses)
(metal; alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials)
- IT 7440-44-0, Carbon, uses 7782-42-5, Graphite, uses 484039-84-1, Cobalt lithium fluoride phosphate ($\text{CoLi}_2\text{F}(\text{PO}_4)$) 484039-86-3, Iron lithium fluoride phosphate ($\text{FeLi}_2\text{F}(\text{PO}_4)$) 484039-88-5
RL: DEV (Device component use); USES (Uses)
(alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials)
- IT 52934-02-8P, Cobalt lithium fluoride phosphate 477779-87-6P, Sodium vanadium fluoride phosphate NaVFPO_4 484039-91-0P, Lithium nickel fluoride phosphate ($\text{Li}_2\text{NiF}(\text{PO}_4)$) 484039-93-2P, Iron lithium fluoride phosphate 484039-95-4P, Lithium manganese fluoride phosphate ($\text{Li}_2\text{MnF}(\text{PO}_4)$) 484039-97-6P, Copper lithium fluoride phosphate ($\text{CuLi}_2\text{F}(\text{PO}_4)$) 484040-01-9P 484040-04-2P, Sodium vanadium fluoride phosphate ($\text{Na}_1.2\text{VF}_{1.2}(\text{PO}_4)$) 484040-06-4P, Chromium sodium fluoride phosphate 484040-08-6P, Manganese sodium fluoride phosphate ($\text{MnNaF}(\text{PO}_4)$) 484040-10-0P, Cobalt sodium fluoride phosphate ($\text{CoNaF}(\text{PO}_4)$) 484040-12-2P 484040-13-3P, Sodium vanadium hydroxide phosphate ($\text{NaV}(\text{OH})(\text{PO}_4)$) 484040-14-4P, Iron lithium fluoride phosphate ($\text{Fe}_2\text{Li}_4\text{F}(\text{PO}_4)_3$) **484040-15-5P**, Lithium vanadium fluoride phosphate ($\text{Li}_4\text{V}_2\text{F}(\text{PO}_4)_3$) **484040-20-2P**, Lithium manganese fluoride phosphate ($\text{Li}_5\text{Mn}_2\text{F}_2(\text{PO}_4)_3$) 484040-22-4P, Lithium vanadium fluoride phosphate ($\text{Li}_6\text{V}_2\text{F}(\text{PO}_4)_3$) 484040-25-7P 484040-27-9P 484040-28-0P
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials)

L2 ANSWER 3 OF 13 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1986:556277 CAPLUS

DOCUMENT NUMBER: 105:156277

TITLE: Type locality minerals of the Black Hills, South
Dakota

AUTHOR(S): Triscori, Kurt L.; Campbell, Thomas J.

CORPORATE SOURCE: Mus. Geol., South Dakota Sch. Mines Technol., Rapid
City, SD, 57701, USA

SOURCE: Mineralogical Record (1986), 17(5), 297-302

CODEN: MRECA7; ISSN: 0026-4628

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Minerals are described from various rocks of the type localities ranging
from the Precambrian Au veins and pegmatites to Tertiary replacement
deposits.

IT 12274-48-5 **12274-59-8** 42578-75-6 42578-75-6 51198-76-6
51198-90-4 53262-76-3 54652-49-2 59165-45-6 60686-76-2
63919-79-9 67338-72-1 71211-59-1 72276-46-1 72276-48-3
88853-89-8 89900-13-0 89900-14-1 90014-26-9 97380-82-0
100164-48-5

RL: OCCU (Occurrence)

(type locality of, of Black Hills, South Dakota)

L1 1 GRIPHITE/CN

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L1 ANSWER 1 OF 1 REGISTRY COPYRIGHT 2003 ACS on STN
RN 12274-59-8 REGISTRY
CN **Griphite (8CI, 9CI)** (CA INDEX NAME)
MF Al . Ca . F . Fe . H O . Li . Mg . Mn . Na . O4 P
AF A18 Ca6 F4-8 Fe0-9.5 H0-4 Li2 Mg0-9.5 Mn9.5-19 Na4 O96-100 P24
CI MNS, TIS
LC STN Files: AGRICOLA, CA, CAPLUS

Component	Ratio	Component Registry Number
F	4 - 8	14762-94-8
HO	0 - 4	14280-30-9
O4P	24	14265-44-2
Ca	6	7440-70-2
Na	4	7440-23-5
Mn	9.5 - 19	7439-96-5
Mg	0 - 9.5	7439-95-4
Li	2	7439-93-2
Fe	0 - 9.5	7439-89-6
Al	8	7429-90-5

13 REFERENCES IN FILE CA (1937 TO DATE)
13 REFERENCES IN FILE CAPLUS (1937 TO DATE)

L Number	Hits	Search Text	DB	Time stamp
1	89	BARKER-JEREMY	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/09/08 11:03
2	253	Nasicon and electrode	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/09/08 11:04
4	15	(Nasicon and electrode) and (oxy or fluoro)	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/09/08 11:05

L Number	Hits	Search Text	DB	Time stamp
1	102	("4194062" or "4464447" or "4477541" or "4668595" or "4792504" or "4830939" or "3736184" or "4925752" or "4935317" or "4990413" or "5011501" or "5028500" or "5037712" or "5130211" or "4009092" or "4049891" or "5262253" or "4098687" or "5300373" or "5326653" or "4260668" or "5399447" or "5411820" or "5418090" or "5418091" or "5435054" or "5456000" or "5460904" or "5463179" or "5482795" or "5508130" or "5514490" or "4434216" or "5538814" or "5540741" or "5541020" or "5620810" or "5643695" or "5660948" or "4512905" or "5695893" or "5700298" or "5712059" or "4683181" or "4690877" or "4707422" or "4803137" or "4985317" or "5232794" or "5262548").pn.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/09/09 11:15
2	102	("4194062" or "4464447" or "4477541" or "4668595" or "4792504" or "4830939" or "3736184" or "4925752" or "4935317" or "4990413" or "5011501" or "5028500" or "5037712" or "5130211" or "4009092" or "4049891" or "5262253" or "4098687" or "5300373" or "5326653" or "4260668" or "5399447" or "5411820" or "5418090" or "5418091" or "5435054" or "5456000" or "5460904" or "5463179" or "5482795" or "5508130" or "5514490" or "4434216" or "5538814" or "5540741" or "5541020" or "5620810" or "5643695" or "5660948" or "4512905" or "5695893" or "5700298" or "5712059" or "4683181" or "4690877" or "4707422" or "4803137" or "4985317" or "5232794" or "5262548").pn.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/09/09 11:16
3	0	((("4194062" or "4464447" or "4477541" or "4668595" or "4792504" or "4830939" or "3736184" or "4925752" or "4935317" or "4990413" or "5011501" or "5028500" or "5037712" or "5130211" or "4009092" or "4049891" or "5262253" or "4098687" or "5300373" or "5326653" or "4260668" or "5399447" or "5411820" or "5418090" or "5418091" or "5435054" or "5456000" or "5460904" or "5463179" or "5482795" or "5508130" or "5514490" or "4434216" or "5538814" or "5540741" or "5541020" or "5620810" or "5643695" or "5660948" or "4512905" or "5695893" or "5700298" or "5712059" or "4683181" or "4690877" or "4707422" or "4803137" or "4985317" or "5232794" or "5262548").pn.) not (("4194062" or "4464447" or "4477541" or "4668595" or "4792504" or "4830939" or "3736184" or "4925752" or "4935317" or "4990413" or "5011501" or "5028500" or "5037712" or "5130211" or "4009092" or "4049891" or "5262253" or "4098687" or "5300373" or "5326653" or "4260668" or "5399447" or "5411820" or "5418090" or "5418091" or "5435054" or "5456000" or "5460904" or "5463179" or "5482795" or "5508130" or "5514490" or "4434216" or "5538814" or "5540741" or "5541020" or "5620810" or "5643695" or "5660948" or "4512905" or "5695893" or "5700298" or "5712059" or "4683181" or "4690877" or "4707422" or "4803137" or "4985317" or "5232794" or "5262548").pn.))	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/09/09 11:16
4	4	("6514640" or "20010055718").pn.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/09/09 13:15
5	3	("4526844" "4959281" "5721070").PN.	USPAT	2003/09/09 11:20
6	3	5721070.URPN.	USPAT	2003/09/09 11:23
7	7	"5721070"	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/09/09 13:21
8	27	("5296436" or "5804335" or "5830602" or "5851504" or "5869207" or "5871866" or "5910382" or "6004697" or "6020087" or "6103419" or "6136472" or "6153333" or "6183718" or "6306215").pn.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/09/09 13:21